

PREHARVEST CHEMICAL TOP-KILLING AS A POSSIBLE
AID IN THE NATURAL DRYING AND HARVESTING
OF SMALL GRAINS, CORN AND SOYBEANS

BY

GEORGE SAMUEL COOPER

B.Sc., University of Alberta, 1949

M.Sc., University of Alberta, 1951



AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN AGRONOMY
IN THE GRADUATE COLLEGE OF THE
UNIVERSITY OF ILLINOIS, 1953

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The practicability of applying a preharvest-chemical spray to shorten the normal time of drying of crop plants has been studied to a limited extent only. The work has been confined largely to such crops as alfalfa, clover and soybeans. The results, thus far, indicate that this practice has value in the harvesting of these crops. If this practice were applicable to other crops, dates of harvest and moisture content of the harvested grain could be controlled to a certain degree.

Top-killing may aid in reducing the moisture content of corn, wheat, oats, barley and soybeans and permit earlier than normal harvesting or, at least, the harvesting of these crops with a low enough moisture content to store safely. It would be of value in enhancing the efficiency of such harvesting implements as the combined picker-sheller for corn and the combine harvester for wheat, oats, barley and soybeans.

The present work was undertaken to determine if the chemical top-killing of corn, wheat, oats, barley and soybeans was a practical method of aiding in harvesting of grain with a low moisture content. Several contact-killing chemicals were used to treat double-cross and single-cross corn hybrids, wheat, oats, barley and soybeans. Studies were carried out to determine the rate of moisture loss from treated as compared to untreated material. Treatments were applied to crops when the grain contained various amounts of moisture. Investigations were also made to determine what effects top-killing had on yield, germination, protein and oil content of the treated grain.

The chemicals used in these tests were sodium cyanamid (X5) 65 per cent, disodium 3,6-endoxohexahydrophthalate

(endathol) potassium cyanate, sodium isopropyl zanthate (NIX), pentachlorophenol (PCP) and dinitrophenol (DN). The chemicals were applied by means of a Hudson five-gallon tank sprayer for small plots and by means of a Hahn Hi-Boy pressure sprayer for large field areas.

RESULTS AND CONCLUSIONS

1. No suitable index as to the time of application of the chemical has been established.
2. The application of preharvest chemicals on soybeans was not necessary to dry the beans in 1951, but it was necessary to control green weeds in fields where weeds would have delayed harvesting of the beans when they were ready to combine.
3. The chemicals at the rates used, did not affect germination of the seeds of crops treated in these tests.
4. In most cases the application of chemical top-killers resulted in a reduction in yield when compared to the checks. The yield reduction decreased as the date of application of the chemical was delayed.
5. There was no apparent reduction in protein or oil content of the corn treated in 1952.
6. The effectiveness of chemical top-killers was not increased by topping the corn prior to application of the chemical.
7. The practice of chemical top-killing did not weaken the stalks of the corn plant.
8. The use of the above mentioned chemicals in high gallonages of water gave better results than when applied at low gallonage rates.
9. The moisture content of small grains can be successfully reduced by chemical top-killing when the temperature at the time of application and shortly afterwards is above 65° F.

10. The top-killing of small grains may eliminate the loss of grain in the swath during seasons of poor harvest conditions.
11. The success of top-killing is dependent largely upon correct coverage and upon temperature at and immediately following application of the chemical.
12. Under adverse drying conditions, the use of chemical top-killers may be of a much greater benefit than under ideal drying conditions.
13. The moisture content of corn can be reduced by preharvest top-killing, but the amount of reduction in moisture varies with the season.
14. The top-killing of annual crops presents many questions which are not encountered in the top-killing of legume crops such as alfalfa and clover.

VITA

George Samuel Cooper was born at Medicine Hat, Alberta, Canada, October 18, 1914, and received his elementary education at Riverside public school. He attended Alexander High School, Medicine Hat, Alberta, and graduated with honors in 1933. In September 1933 he entered the Calgary Normal School and graduated in June 1934 with a First-Class teaching certificate. He taught school and attended Summer School, University of Alberta, each year until 1939. He then enlisted in the Canadian Army (Active) and served until September 1945. He enrolled in the University of Alberta in September 1945, graduated with high distinction and received the Bachelor of Science Degree in Agriculture in May 1949. He enrolled in the Graduate College of the University of Alberta in 1949 and received the degree of Master of Science in May 1951.

Since June 1951 he has been enrolled in the Graduate College of the University of Illinois and has been pursuing work toward the degree of Doctor of Philosophy in Crop Production with minors in Soils and Botany.

In December 1936 he was married to Miss Esther LeVine, Grimshaw, Alberta. They have one daughter, Donna Leanne.

